Group A *Streptococcus* (Invasive)

Section 1: ABOUT THE DISEASE

A. Etiologic Agent

Invasive group A streptococcal disease (GAS) is caused by the bacterium *Streptococcus pyogenes.* There are over 100 serologically distinct types of *S. pyogenes* within group A.

B. Clinical Description

Pharyngitis (strep throat) is the most common infection with group A *Streptococcus*. Skin infections (impetigo or pyoderma) are also common. In some cases, the bacteria may become invasive and may cause more severe illness. Invasive GAS infection may manifest as any of several clinical syndromes including: 1) pneumonia, 2) bacteremia in association with cutaneous infection, 3) deep soft tissue infection (i.e., necrotizing fasciitis—colloquially referred to as "flesh-eating bacteria"), 4) meningitis, 5) peritonitis, 6) osteomyelitis, 7) septic arthritis, 8) postpartum sepsis (i.e., puerperal fever), 9) neonatal sepsis, 10) bacteremia, and 11) streptococcal toxic shock syndrome (STSS). Case-fatality rates for some of these syndromes can range from 10–70%.

C. Vectors and Reservoirs

Humans are the only reservoir for *S. pyogenes.*

D. Modes of Transmission

The modes of transmission of GAS are large respiratory droplets and person-to-person spread through direct contact with infected individuals or carriers. Indirect person-to-person spread through objects can sometimes transmit GAS as well. Nose, throat, skin, anal, and vaginal carriers can all serve as sources of GAS infection.

E. Incubation Period

The incubation period for GAS pharyngitis is usually short: 1–5 days and rarely longer. The incubation period for invasive GAS disease is variable and depends on the infection.

F. Period of Communicability or Infectious Period

In untreated, uncomplicated GAS disease, the infectious period starts several days before onset of symptoms and lasts from 10–21 days. If purulent discharge is present, the infectious period may be extended from weeks to months. Persons with untreated GAS pharyngitis may carry and transmit the bacteria for weeks or months, with contagiousness sharply decreasing 2–3 weeks after onset of the illness.

G. Epidemiology

Estimates of the annual incidence rates of invasive GAS disease in North America have ranged from 1.5–7.0 cases per 100,000 population. Of the estimated 10,000–15,000 cases of invasive GAS infection in the U.S. each year, between 500 and 1,500 cases have necrotizing fasciitis. Surveillance studies have suggested that 85% of invasive GAS infections occur sporadically in the community; 10% are hospital-acquired; 4% occur in long-term care facilities; and 1% occur after close contact with a case. Nosocomial outbreaks and cases of invasive GAS infection have been traced to health care workers who were anal, vaginal, skin, or throat carriers of GAS.

Invasive GAS disease occurs year-round, with a peak incidence reported from December through March. People who have chronic cardiac or pulmonary disease, diabetes mellitus or HIV infection, or who inject drugs or abuse alcohol are believed to be at higher risk for invasive GAS infection. In children, varicella infection has been identified as a significant risk factor for invasive GAS infection. Infection with GAS may be followed by the non-infectious complications of rheumatic fever (characterized by arthritic, cardiac, and/or neurologic signs and symptoms) or glomerulonephritis (inflammation of the kidneys that affects kidney function). One goal of treating cases (with at least ten days of antibiotic therapy) is to prevent these sequelae.

H. Bioterrorist Potential

This pathogen is not considered to be of risk for use in bioterrorism.

Section 2: REPORTING CRITERIA AND LABORATORY TESTING

A. What to Report to the Massachusetts Department of Public Health (MDPH)

Report any of the following:

- Isolation of GAS (*S. pyogenes*) by culture from a normally sterile site (e.g., blood or cerebrospinal fluid [CSF] or, less commonly, joint, pleural, or pericardial fluid);
- Cases of necrotizing fasciitis associated with GAS infection; and
- Case of toxic shock syndrome (TSS) with GAS infection grown from **ANY** site.

Note: See Section 3C for information on how to report a case.

B. Laboratory Testing Services Available

The MDPH State Laboratory Institute (SLI), Reference Laboratory will test specimens for the presence of GAS when specimens are submitted as part of an epidemiologic investigation conducted by the MDPH. In some outbreak circumstances, isolates may be sent to the Centers for Disease Control and Prevention (CDC) for typing.

For more information on submitting specimens, contact the SLI Reference Laboratory at (617) 983-6607.

Section 3:

REPORTING RESPONSIBILITIES AND CASE INVESTIGATION

A. Purpose of Surveillance and Reporting

- To identify close contacts of the case, to provide recommendations for appropriate preventive measures, and to thus prevent infection and complications in the contacts as well as further spread of infection.
- To provide information about the disease, its transmission, and methods of prevention.
- To identify clusters or outbreaks of disease promptly in order to initiate appropriate prevention and control measures. If an outbreak of invasive GAS disease is identified in a community or in an organization such as a school or daycare center, varicella vaccination might be recommended if cases are associated with chickenpox, or prophylactic antibiotics might be recommended to certain groups, depending on the number of cases and the community or organization involved.
- To identify potential post-surgical or post-partum infections that may be traced to carriers involved in direct patient care.

B. Laboratory and Health Care Provider Reporting Requirements

Invasive GAS infection is reportable to the local board of health (LBOH). The MDPH requests that health care providers immediately report to the LBOH in the community where the case is diagnosed, all confirmed or suspect cases of invasive GAS infection, as defined by the reporting criteria in Section 2A.

Laboratories performing examinations on any specimens derived from Massachusetts residents that yield evidence of invasive GAS infection shall report such evidence of infection directly to the MDPH within 24 hours.

C. Local Board of Health (LBOH) Responsibilities

Reporting Requirements

MDPH regulations (*105 CMR 300.000*) stipulate that invasive GAS infection is reportable to the LBOH and that each LBOH must report any case of invasive GAS infection or suspect case of invasive GAS infection, as defined by the reporting criteria in Section 2A. Cases should be reported to the MDPH Bureau of Communicable Disease Control, Office of Integrated Surveillance and Informatics Services (ISIS) using an official MDPH *Invasive Group A Streptococcus Case Report Form* (found at the end of this chapter). Refer to the *Local Board of Health Timeline* at the end of this manual's *Introduction* section for information on prioritization and timeliness requirements of reporting and case investigation.

Case Investigation

1. It is requested that LBOH complete a MDPH *Invasive Group A Streptococcus Case Report Form* (found at the end of this chapter) by interviewing the case and others who may be able to provide pertinent information. Much of the information required on the form can be obtained from the health care provider or from the medical record.
2. Use the following guidelines to assist in completing the form:
   a. Accurately record the demographic information.

b. Accurately record clinical information, including date of symptom onset, whether hospitalized (and associated hospital information and dates), and other medical information.

c. Indicate the type of infection caused by GAS.

d. Indicate the type of specimen from which GAS was isolated/identified (e.g., blood, CSF).

e. Note the date of the first positive culture.

f. Ask about varicella history (two weeks prior to infection) because invasive GAS infection may be a complication of a prior varicella infection.

g. Indicate whether or not the case attends or is employed at a daycare center, school, or long-term care facility, and whether there have been cases of varicella or other cases of GAS infection at the facility.

h. Determine whether this is a post-surgical infection. The post-surgical time period includes all inpatient days after a surgical procedure and seven days after discharge.

i. Determine whether the infection occurred post-partum. The post-partum time period includes all in-patient days after the delivery of a baby and seven days after discharge.

j. If you have made several attempts to obtain case information but have been unsuccessful (e.g., the case or health care provider does not return your calls or respond to a letter, or the case refuses to divulge information or is too ill to be interviewed), please fill out the form with as much information as you have gathered. Please note on the form the reason(s) why it could not be filled out completely.

3. After completing the form, attach laboratory report(s) and fax or mail (in an envelope marked "Confidential") to ISIS. The confidential fax number is (617) 983-6813. Call ISIS at (617) 983-6801 to confirm receipt of your fax. The mailing address is:

MDPH, Office of Integrated Surveillance and Informatics Services (ISIS)
305 South Street, 5th Floor
Jamaica Plain, MA 02130
Fax: (617) 983-6813

4. Institution of disease control measures is an integral part of case investigation. It is the responsibility of the LBOH to understand, and if necessary, institute the control guidelines listed in Section 4.

Section 4:
CONTROLLING FURTHER SPREAD

A. Isolation and Quarantine Requirements *(105 CMR 300.200)*

None.

B. Protection of Contacts of a Case

Depending on the number of cases of invasive GAS infection and the situation, recommendations may include antibiotic prophylaxis for potential carriers, varicella vaccination for susceptible children, and throat cultures for contacts of cases. See Section 4C for more information.

C. Managing Special Situations

Daycare

One case of invasive GAS infection in a daycare is not usually cause for alarm. However, to determine the extent of the situation, the following questions should be posed:

- Was the case's illness preceded by varicella infection?
- Have any varicella cases been reported in the daycare in the previous two weeks? If so, how many and what were the dates of onset?
- Have any cases of pharyngitis or impetigo been reported at the daycare in the previous two weeks? If so, how many and what were the dates of onset?

The recommendations for control will depend on the answers to these questions. Please contact the MDPH Division of Epidemiology and Immunization at (617) 983-6800 or (888) 658-2850 to report suspect or confirmed cases in a daycare or any other setting. An epidemiologist will work with you to ensure all contacts are identified and notified. In addition, surveillance data are necessary to determine the presence of an outbreak or cluster of cases of disease.

School

As described above for the daycare setting, one case of invasive GAS infection in a school is not necessarily a cause for alarm. While GAS is much more likely to spread in a daycare setting, you still need to determine if the case recently had varicella and how many cases of pharyngitis, impetigo, and varicella are occurring in the school. As in a daycare, the recommendations for control will depend on the answers to these questions. A MDPH epidemiologist will work with you to determine the best prevention and control measures to implement and will provide information on how to respond to one or more cases of invasive GAS infection.

Hospital

GAS is an unusual cause of surgical site or post-partum infections. The bacterium is only isolated from <1% of surgical-site infections and 3% of infections after vaginal delivery. Since most nosocomial transmission is traced to carriers involved in direct patient care, even one case of post-operative or post-partum GAS infection should be vigorously investigated. Usually, the infection control practitioner (ICP) or hospital epidemiologist will investigate to find a possible carrier. Investigations usually consist of medical and laboratory record reviews, further testing of the GAS isolates, screening health care workers from multiple sites, and sometimes, environmental testing.

Long-Term Care Facilities

Although rare, cases of invasive GAS infection in a long-term care facility sometimes occur. Steps should be taken to rule out the possibility of a more widespread problem. Surveillance should be done to identify any cases of varicella or other cases of invasive GAS infection occurring among staff or attendees in the previous two weeks. Additional cases of invasive GAS infection and/or corresponding cases of varicella would require a more vigorous response. A MDPH epidemiologist will work with you to determine the best prevention and control measures to implement as well as how to proceed with a more rigorous investigation.

Reported Incidence Is Higher Than Usual/Outbreak Suspected

If the number of reported cases of invasive GAS infection in your city/town is higher than usual or if you suspect an outbreak in a school, daycare, hospital, or long-term care facility, please contact the MDPH Division of Epidemiology and Immunization at (617) 983-6800 or (888) 658-2850 as soon as possible. This situation may warrant an investigation of clustered cases to determine a course of action to prevent further cases. The Division can also perform surveillance for cases across town lines, which would otherwise be difficult to identify at the local level.

D. Preventive Measures

Environmental Measures

Advise daycare centers to clean toys daily using an approved disinfectant (an EPA-registered sanitizing solution safe for use in the daycare setting) and to discourage the use of play food, which facilitates the transmission of not only this bacterium but many others as well.

Personal Preventive Measures/Education

To avoid future exposures, advise individuals to:

- Practice good hygiene and frequent handwashing;
- Avoid sharing food, beverages, cigarettes, or eating utensils; and
- Receive varicella vaccine if susceptible to varicella (see the *Chickenpox and Shingles* chapter for more information).

A Group A Streptococcal Disease Public Health Fact Sheet is available from the MDPH Division of Epidemiology and Immunization or on the MDPH website at www.mass.gov/dph. Click on the "Publications and Statistics" link, and select the "Public Health Fact Sheets" section under "Communicable Disease Control."

ADDITIONAL INFORMATION

The formal CDC surveillance case definition for invasive GAS disease is the same as the criteria outlined in Section 2A of this chapter. (The CDC and the MDPH use the CDC case definitions to maintain uniform standards for national reporting.) For reporting to the MDPH, always use the criteria outlined in Section 2A.

Note: The most up-to-date CDC case definitions are available on the CDC website at www.cdc.gov/epo/dphsi/casedef/case_definitions.htm.

REFERENCES

"Active Bacterial Core Surveillance Report, Group A Streptococcus." Emerging Infections Program Network. May 2004. <www.cdc.gov/ncidod/dbmd/abcs/survreports/gas03prelim.pdf>.

American Academy of Pediatrics. [Group A Streptococcal Infections.] In: Pickering L.K., ed. *Red Book: 2003 Report of the Committee on Infectious Diseases, 26th Edition.* Elk Grove Village, IL, American Academy of Pediatrics; 2003: pp. 573–584.

American Academy of Pediatrics. Severe Invasive Group A Streptococcal Infections: A Subject Review. *Pediatrics*. 1998; 101: 136–140.

CDC. Case Definitions for Infectious Conditions Under Public Health Surveillance. *MMWR*. 1997; 46(RR-10).

CDC. Nosocomial Group A Streptococcal Infections Associated with Asymptomatic Health Care Workers—Maryland and California. *MMWR*. 1997; 48: 8.

O'Brien, K.L., Beall, B., Barrett, N.L., et al. Epidemiology of Invasive Group A Streptococcus Disease in the United States, 1995–1999. *Clin Infect Dis.* 2002; 35: 268–76.

Heymann, D., ed. *Control of Communicable Diseases Manual, 18th Edition*. Washington DC, American Public Health Association, 2004.

MDPH. *Regulation 105 CMR 300.000: Reportable Diseases, Surveillance, and Isolation and Quarantine Requirements.* MDPH, Promulgated November 4, 2005.

The Prevention of Invasive Group A Streptococcal Infections Workshop Participants. Prevention of Invasive Group A Streptococcal Disease Among Household Contacts of Case Patients and Among Postpartum and Postsurgical Patients: Recommendation from the Centers for Disease Control and Prevention. *Clin Infect Dis*. 2002; 35: 950–959.

Working Group on Prevention of Invasive Group A Streptococcal Infections. Prevention of Invasive Group A Streptococcal Disease Among Household Contacts of Case-Patients. *JAMA*. 1998; 279: 1206–1210.

FORMS & WORKSHEETS

Group A Streptococcus
(Invasive)

Group A *Streptococcus* (Invasive)

LBOH Action Steps

This form does not need to be submitted to the MDPH with the case report form. It is for LBOH use and is meant as a quick-reference guide to group A streptococcus (GAS) case investigation activities.

LBOH staff should follow these steps when GAS is suspected or confirmed in the community. For more detailed information, including disease epidemiology, reporting, case investigation, and follow-up, refer to the preceding chapter.

- ❑ Notify MDPH Division of Epidemiology and Immunization at (617) 983-6800 or (888) 658-2850 to report any suspect case(s) of invasive GAS.
- ❑ Obtain laboratory confirmation. (GAS isolated from blood, joint fluid, peritoneal fluid, or cerebrospinal fluid [CSF].)
- ❑ Determine if the case has a history of surgery within seven days of symptom onset (post-operative case) or if the case has given birth within seven days of symptom onset (post-partum case).
- ❑ Fill out the case report form (attach laboratory results).
- ❑ Send the completed case report form (with laboratory results) to the MDPH Bureau of Communicable Disease Control, Office of Integrated Surveillance and Informatics Services (ISIS).